

Preparing E-Health Ready Graduates: A Qualitative Focus Group Study

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Abstract. Background. Well documented demand for an e-health ready workforce is placing increasing pressure on universities to deliver essential e-health education. **Aim.** We aimed to explore stakeholders' perceptions of e-health knowledge and skills anticipated of workforce-ready tertiary graduates from clinical health degree programs. **Method.** A qualitative research study of a purposively selected sample of 23 key informants with expertise and/or experience in e-health education, practice and/or policy was conducted. Data collection involved focus group interviews that were recorded, transcribed verbatim and underwent thematic analysis. **Findings.** Three primary themes about e-health education and preparation of health graduates emerged from the analyses: 1) Reinforce fundamental competencies, 2) Acknowledge and adapt existing competencies, and 3) Introduce and provide opportunities for new learning. **Conclusions and Implications.** This study will inform the articulation of a consensus driven set of core competencies for a cross-faculty e-health curriculum that aligns with workforce expectations. There is also potential for vertical integration of findings into workforce development programs.

Introduction

Well documented demand for an e-health ready workforce^{1,2} is driving calls for e-health to be integrated into tertiary clinical health degree programs¹⁻³. E-health has been recognised as a key element in recent health reforms, with the potential to ensure better patient care^{4,5}. Health services increasingly expect e-health readiness to practice within digital health environments⁶.

Explicit competencies in health informatics have been published^{7,8}, providing valuable reference points for workforce development of technical and informatics literacy. However, practices involving e-health are rapidly extending to include how the integration of digital health information and technology transforms and enhances how we deliver healthcare. e-health work readiness must expand beyond a primary focus on technical and informatics competencies to include the preparation of a workforce that can use e-health in practice to, amongst other things, inform decision making, empower patients, promote health and wellness and enable new models of care. Workforce e-health competency frameworks are emerging for specific professions⁹, however, there remains limited understanding and agreement on the core e-health competencies anticipated of tertiary graduates.

This study aimed to investigate stakeholder perceptions of e-health knowledge and skills anticipated of workforce ready tertiary health graduates. This study forms one

component of a larger 'eHealthMap' project, which aims to provide students across the university's faculties of health with consistent, high-quality education experiences that facilitate the development and practice of essential e-health competencies. The ultimate aim is to align the University's approach to e-health education with best evidence and national expectations of workforce ready graduates.

1. Methods

A qualitative research design was used to sample informant opinions and experiences via focus group interviews. The study was conducted at the University of Sydney. Participants were recruited via purposeful sampling to ensure a representative spread. Inclusion criteria were that they have significant expertise and/or vested interests in e-health education, practice or policy. A research officer invited potential participants via email. Participation was voluntary and informed consent was obtained from all participants. Ethical approval was obtained from the University of Sydney Human Research Ethics Committee (Protocol No. 2016/811).

Data was collected during a workshop conducted in February 2017. The workshop included two focus group sessions: 1) a large group focus group (N=23, 1hr and 14mins), and 2) four small breakout focus groups (N=5-6 per group, 45mins). A semi-structured script, including the following questions, encouraged topic exploration: a) What e-health competencies do you expect health graduates to be able to demonstrate? and b) Could you provide some examples of how these competencies are taught or applied in your organisation?

Each focus group was facilitated by a researcher experienced in qualitative research methods. To stimulate discussions, participants were presented with high level domains of competencies identified via a rapid review of peer-reviewed and grey literature, including ICT literacy, Data and health information, Communication, Transforming care, and Professionalism.

Interviews were transcribed verbatim and thematically analysed¹⁰ independently by two authors (DM and MB). Line-by-line coding was used, with themes and sub-themes systematically refined until saturation was achieved.

2. Results

A total of 23 key informants agreed to participate. The majority of participants were female (n=15, 65%) and University of Sydney faculty representatives (n=11, 48%), including academics from physiotherapy, speech pathology, psychology, nursing, dentistry, pharmacy, medicine, IT & engineering and mathematics & statistics. The remainder of participants comprised broad representation from health services (n=9) and state and national government health agencies (n=3), including senior executives, clinicians, senior health administrators. Participants also included recent health professional graduates (n=2) and a current student.

Three primary themes, encompassing multiple-sub-themes, emerged from the analyses: 1) Reinforce fundamental competencies, 2) Acknowledge and adapt existing competencies, and 3) Introduce and provide opportunities for new learning. Each theme contained multiple sub-themes.

2.1. Reinforce Fundamental Competencies

A reoccurring theme was the need to reinforce fundamental competencies for professional practice including quality and safety, communication, problem solving, critical analysis, patient-centredness and other generic professional attributes. One participant asserted that we shouldn't be too "tunnel-visioned" with regards to the electronic side of e-health, but focus on the core competencies for health professionals, while ensuring that they are transferable to e-health environments. Participants emphasised safety and quality as the fundamental cross-cutting principle for all health and healthcare activities, inclusive of all e-health interactions and implementations.

Participants discussed the decline in effective clinical communication skills, inclusive of history taking, reporting on episodes of care and providing clinical handover, and impacting all communication mediums, i.e. verbal, written paper records and electronic data entry. Emphasis was placed on the perceived decline of effective documentation, in particular the ability to record a representative clinical narrative. One participant hypothesised that, rather than being the cause of poor practice, electronic records were highlighting how some practices and skills have eroded over time. Thus, participants emphasised the importance of reinforcing fundamental communication skills within digital contexts.

Participants provided examples of when and how interactions with digital systems went awry, such as connectivity or technical problems during web-based conferencing. While it was acknowledged that negative encounters can be discouraging for users, participants had observed how experiences can be used as opportunities for reinforcing problem solving skills and developing 'improvement-minded' individuals. It was recommended that students be exposed to challenges and be involved in active problem solving with digital systems.

Critical appraisal was considered another core competency of relevance, including appraisal of e-health sources information and the technology itself. The "I did this because the computer told me so" phenomenon was discussed, with participants agreeing that, while clinical decision support systems play a role in evidence-based practice, they should never become the sole basis of a clinician's decision making process. It was considered essential to be able to establish the evidence-base, identify safety concerns, and determine factors that promote or inhibit good practice, including any unintended consequences.

Patient-centred approaches involving e-health were discussed, including acknowledging and engaging patients as reliable information sources. It was emphasised how the rollout of patient-controlled electronic records provided new opportunities for patients to directly input and manage their own health data. Also, in light of the growing health and wellness industry, participants agreed that there needs to be consideration of the role of self-generated health data, such as data from activity trackers and monitoring devices.

Participants highlighted a number of professional graduate attributes applicable to practice involving e-health, including the principles of lifelong learning, reflective practice, interprofessional practice, and the ethical use of health information. Participants discussed the personal professional responsibilities to stay up-to-date with current and emerging technologies, to understand personal professional boundaries in technology use, and to ensure privacy, confidentiality and appropriate use of data. One participant asserted that students need to be equipped with lifelong learning skills so they are ready to learn and develop from on-the-job experiences.

2.2. *Acknowledge and Adapt Existing Competencies*

Participants asserted the need to acknowledge and build upon existing student competencies, including the advanced digital literacy they have developed from frequent interactions with sophisticated digital tools. Participants claimed that, in general, our current students are “digital natives”, with another suggesting that they are more technical literate than the practice environments they are entering. It was asserted that most students do not require specific technical training. It was outlined by an academic researcher, however, that, while students have relevant competence, they lack understanding of how these skills apply to clinical practice. Participants recommended providing opportunities that allow students to adapt and apply their existing knowledge of digital technologies within ‘new scripts’ appropriate to health.

Participants acknowledged that, in comparison to their interactions with other everyday technologies, students may be disappointed with the e-health interactions they encounter upon entering the workplace. Participants recommended engaging students in co-design of e-health improvements and innovations that help to address rudimentary systems, user interface issues and enhancements to improve workflows. It was deemed important that students develop a sense of empowerment to identify and report opportunities for improvements and generate solutions. It was suggested that students and recent graduates may feel that they are in an inferior or less experienced position, which makes them hesitant to voice observations and propose potential improvements. Participants recommended reframing any negativities about current systems challenges into optimism about opportunities for improvement.

It was suggested that providing a historical overview, with examples of current systems evolutions and emerging technologies, would establish a sense of where we’ve come from and where we are going. Participants asserted that helping students to understand overarching principles, purposes, and benefits of systems and technologies would best foster individual intrinsic motivation to adopt existing systems, while positioning them well to be adaptive to future evolutions and emerging innovations.

2.3. *Introduce and Provide Opportunities for New Learning*

Participants highlighted a number of priority learning topics, including working with health data, integrating multiple health information sources and practicing new models of care, and emphasised opportunities to integrate e-health interactions within existing teaching and learning.

Participants reported a need for students to understand accountability for complete and quality data entries so that it can be useful. The principle of “garbage in, garbage out” was quoted in relation to data entry. It was emphasised that, where illegible handwriting might once have masked poor quality of health information in records, digital systems provide more transparency with typed text, timestamped information and digital signatures.

Perceptions of an electronic record “sink hole” was acknowledged, where data goes in but never comes out. This was said to create frustrations amongst clinicians, who perceived an increasing role as a data entry clerk. It was suggested that, rather than focusing on teaching students how to “hammer stuff in”, a focus is required on teaching the value of quality data. Participants cited curriculum topics including clinical analytics, point-of-care decision support, predictive and precision medicine, and big data analytics, as a means of outlining personal, patient, team, population, and

systems benefits. Other uses of routinely collected data were discussed, including quality improvement, performance appraisal, research, and adaptive education.

Participants recommended students learn about specific issues related to data governance, privacy and security. Of particular relevance are issues relating to cyber security, safe data storage, and the encryption and electronic transfer of large data sets, such as genomics and omics data. It was discussed how image sharing and information exchange via personal mobile devices had changed methods of collegial support and supervision and emphasised the need to reinforce relevant legislative policies.

With the burgeoning fields of aging and chronic disease, participants recommended that students be prepared for e-health-enabled new models of care, including models involving self-management, remote monitoring, and virtual healthcare. With this comes a significant shift in the role of the healthcare professional, from paternalistic and hands-on roles, to roles more akin to being a partner, mentor, or coach. This included acknowledgement of the professionals' role in consumer empowerment for e-health, such as supporting their health literacy and appraisal skills for use of online health information, forums, and Apps for self-management.

Participants acknowledged how the growing availability of digital health information is placing new demands on health professionals to access and integrate multiple and various sources of information. Participants suggested supporting students to effectively integrate and filter information sources to avoid information overload. A typology of e-health systems was recommended, including for example existing electronic records, dispensing, imaging and financial systems, through to emerging technologies, such as artificial intelligence systems and block-chain technologies.

To tackle any separation of e-health from "usual business" and reinforce integration into everyday practice, it was recommended that digital systems and technologies be embedded broadly across student experiences. It was asserted that if a digital savvy student has learnt in a digital way, it will be business as usual and therefore be "invisible to the student". Integrating analytics and data visualisations into problem based learning tutorials, including Apps in treatment planning, and incorporating co-design in collaborative student projects, were proposed opportunities for "building digital into the learning process". Promoting access, including providing student access logins and creating e-health simulation labs, was considered crucial to increasing hands-on experiences.

3. Discussion

Given the exponential growth in e-health innovations and implementations, it is critical that we ensure that our health workforce is suitably prepared, starting with the tertiary education and training of our future health graduates. A focus on the technical skills required to practice effectively within digital contexts should be maintained and expanded to encompass the competencies that more broadly address the impact e-health is having on professional roles and practice. Findings from this study identified three dominant themes around e-health work readiness: 1) reinforce existing competencies, 2) acknowledge and adapt an individual's existing competencies to make them transferable to e-health contexts, and 3) introduce new learning and provide opportunities for interactions with e-health within education and practice encounters.

It was clear that there is a need to update existing and potentially create new competency statements that accurately reflect the requirements of the roles and work

contexts in the digital age. This involves moving beyond a focus on the technical skills and giving consideration to the broader professional competencies and attributes of an adaptable, improvement-minded and innovative workforce. This includes preparing graduates to integrate e-health into clinical workflows, apply technologies to new models of care, facilitate consumer empowerment, and use routinely collected digital health data to inform practice. Our current students may indeed be hardwired for digital encounters, but they still require quality learning and practice opportunities to ensure that they develop or translate skills and knowledge to effectively practice with emerging technologies in evolving digital workplaces.

4. Conclusions

This paper describes the competency expectations of tertiary health graduates with regards to their preparedness for working in e-health contexts. The findings will inform how tertiary health programs deliver and assess essential e-health education and will also be of potential interest to professional associations, health services and government agencies for vertical integration into workforce development programs.

Strengths of the study include participant breadth of experience and representation of the multiple health professions, but the lack of consumer representation was a study limitation. Future research will include curriculum mapping and analysis of workplace orientation programs to further confirm gaps in the preparation of our health graduates for e-health contexts.

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